Claims

We claim:

1. An imaging system comprising:

an object plane that defines an object plane axis perpendicular to said object plane;

an image receiving device positioned oblique to said object plane axis;

a lens positioned oblique to said object plane axis, wherein said image receiving device and said lens are each positioned with respect to said object plane axis such that the entire object plane is in focus on said image receiving device, and

wherein said image receiving device is chosen from the group consisting of an electronic image receiving device array and a microscope.

2. The system of claim 1 wherein a plane defined by said image receiving device, and a plane defined by said lens each intersect said object plane at a Sheimpflug line.

3. The system of claim 1 wherein said image receiving device and said lens are each pivotally positioned within a main body positioned oblique to said object plane axis.

4. The system of claim 3 wherein said main body is manually manipulated such that the entire object plane is in focus on said image receiving device.

5. The system of claim 1 further comprising a motor that manipulates said image receiving device and said lens such that the entire object plane is in focus on said image receiving device.

6. The system of claim 1 wherein said image receiving device and said lens are each adjustably positioned with respect to said object plane axis such that the entire object plane is in focus on said image receiving device.

7. The system of claim 3 wherein said main body defines an optical axis that extends from said main body to a point where said object plane axis intersects said object plane, wherein said object plane axis and said optical axis define an angle therebetween, and wherein said angle is greater than zero degrees and less than ninety degrees.

8. The system of claim 1 further comprising:

a track positioned in said object plane;

a main body that defines an optical axis positioned oblique to said object plane axis, wherein said image receiving device and said lens are each pivotally secured to said main body;

a first telescoping arm movably secured to said track at a first end and secured to said image receiving device at a second end thereof, wherein a viewing plane of said image receiving device is aligned with an elongate axis of said first telescoping arm;

a second telescoping arm movably secured to said track at a first end and secured to said lens at a second end thereof, wherein a central plane of said lens is aligned with an elongate axis of said second telescoping arm; and

a support arm for supporting said main body relative to said object plane,

wherein said first end of said first telescoping arm and said first end of said second telescoping arm are each adapted for pivotal movement around a common pivot axis.

9. The system of claim 8 further comprising a second support arm for supporting said main body relative to said object plane, a first motor for moving said main body with respect to said support arm, a second motor for moving said support arm relative to said second support arm, a third motor for moving said second support arm with respect to said object plane, and a focusing device for moving said lens with respect to said main body along said optical axis.

10. A method of focusing an entire object plane, comprising the steps of:

providing an image receiving device along an optical axis positioned oblique to an object plane, wherein said image receiving device is chosen from the group consisting of an electronic image receiving device and a microscope;

providing a lens along said optical axis;

positioning said image receiving device so that an image receiving plane of said image receiving device intersects said object plane at a Sheimpflug line, and positioning said lens so that a lens plane of said lens intersects said object plane at

said Sheimpflug line, such that the entire object plane is in focus on said image receiving device.

11. The method of claim 10 wherein said step of positioning said image receiving device is conducted manually and wherein said step of positioning said lens is conducted manually.

12. The method of claim 10 further comprising:

providing a track positioned in said object plane;

providing a first alignment device movably secured to said track at a first end and secured to said image receiving device at a second end thereof, wherein said image receiving plane of said image receiving device is fixedly aligned with an elongate axis of said first alignment device; and

providing a second alignment device movably secured to said track at a first end and secured to said lens at a second end thereof, wherein said central plane of said lens is fixedly aligned with an elongate axis of said second alignment device, and wherein said first end of said first alignment device and said first end of said second alignment device are each adapted for pivoting around a common pivot axis.

13. The system of claim 10 further comprising providing a motor system for moving said image receiving device with respect to said object plane and for moving said lens with respect to said object plane.

14. The system of claim 10 wherein said image receiving device comprises a charged-coupled device array.

15. An optical device comprising:

an image receiving device adjustably positioned along an optical axis oblique to an object plane; and

a lens adjustably positioned along said optical axis,

wherein said image receiving device is chosen from the group consisting of an electronic image receiving device and a microscope.

16. The device of claim 15 wherein said image receiving device defines a plane that intersects said object plane such that the entire object plane is in focus on said image receiving device and wherein said lens defines a plane that intersects said

object plane such that the entire object plane is in focus on said image receiving device.

17. The device of claim 15 wherein said optical device comprises a main body aligned with said optical axis and wherein said image receiving device and said lens are each pivotally secured to said main body.

18. The device of claim 15 further comprising:

a first alignment device movably secured in said object plane at a first end and secured to said image receiving device at a second end thereof, wherein a plane of said image receiving device is aligned with an elongate axis of said first alignment device; and

a second alignment device movably secured in said object plane at a first end and secured to said lens at a second end thereof, wherein a plane of said lens is aligned with an elongate axis of said second alignment device, and wherein said first end of said first alignment device and said first end of said second alignment device are coupled together so as to pivot about a common pivot axis.

19. The device of claim 15 including a computer system for automatically manipulating said image receiving device and said lens such that the entire object plane is in focus on said image receiving device.

20. The device of claim 15 wherein said object plane is adjustable with respect to said image receiving device and said lens such that the entire object plane is in focus on said image receiving device.

21. The system of claim 1 further comprising a first motor that manipulates said image receiving device and a second motor that manipulates said lens such that the entire object plane is in focus on said image receiving device.

22. The system of claim 1 further comprising a motor system for manipulating a position of said image receiving device and a position of said lens with respect to said object plane, and a computer system adapted for sensing a position of said image receiving device and a position of said lens with respect to said object plane and for controlling said motor system so as to manipulate a position of said image receiving device and a position of said lens such that the entire object plane is in focus on said image receiving device.

23. The system of claim 7 further comprising a motor system for manipulating a position of said image receiving device and a position of said lens with respect to said object plane, and a computer system adapted for sensing a position of said image receiving device and a position of said lens with respect to said object plane and for controlling said motor system so as to manipulate a position of said image receiving device and a position of said lens such that the entire object plane is in focus on said image receiving device, and wherein said computer system senses a position of said image receiving device by measuring said angle and by measuring a distance of said image receiving device from said object plane along said optical axis.

24. The method of claim 13 further comprising providing a computer system for controlling said motor system so that the entire object plane is in focus on said image receiving device.

25. The method of claim 24 wherein said computer system includes a position sensor for sensing a position of said image receiving device and a position of said lens with respect to said object plane.

26. An inspection device comprising:

a lens that defines a lens plane,

an electronic image receiving device that defines an electronic image receiving device plane, and

a workpiece that defines a work plane,

wherein said lens plane, said electronic image receiving device plane, and said work plane are aligned according to a Sheimpflug principle.

27. The device of claim 26 wherein a position of said lens and a position of said image receiving device are each manually manipulated with respect to said work plane.

28. The device of claim 26 wherein a first alignment arm is used to align said lens with respect to said work plane, and a second alignment arm is used to align said image receiving device with respect to said work plane.

29. The device of claim 26 further comprising a motor system for aligning said lens and said image receiving device, wherein said motor system includes a sensor for sensing angle information of a position of said lens with respect to said work plane

and angle information of a position of said image receiving device with respect to said work plane to achieve alignment of the lens and the image receiving device according to the Sheimpflug principle.